



HALCON

a product of MVTec



MVTEC BRINGS
HALCON'S CORE
TECHNOLOGIES TO
THE NEXT LEVEL

EN



NEW
VERSION
22.11

MVtec Brings HALCON's Core Technologies to the Next Level

HALCON 22.11 comes with many new and improved features that help you further enhance your machine vision performance. It is available for both the Steady and Progress editions. As a result, in addition to these newest features, HALCON Steady customers now access the numerous new features available in the last Progress releases since HALCON 20.11.

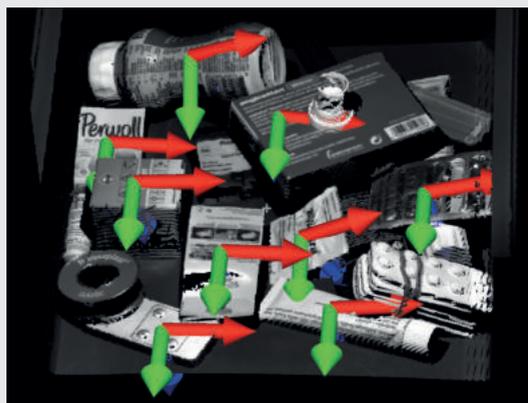
New Features in HALCON 22.11

3D GRIPPING POINT DETECTION

HALCON 22.11 combines 3D vision and deep learning for the first time. The 3D Gripping Point Detection can be used to robustly detect surfaces on any object that is suitable for gripping with suction. In contrast to classic bin-picking applications, the 3D Gripping Point Detection is a CAD-less approach, hence no prior knowledge of the respective objects is required. This increased flexibility opens up completely new application fields, such as those in the logistics industry or warehouses.



HALCON's 3D gripping point detection enables robust bin-picking of unknown objects with a vacuum gripper...



...by providing the 3D poses of the gripping points.

NEW DATA TYPE "MEMORY BLOCK"

As of HALCON 22.11, users can store and transfer binary data (e.g., images) in HALCON as well as further process it with other applications. This increases the software's compatibility with machine communication protocols, such as OPC UA or image acquisition interfaces.



HALCON 22.11 includes a new encryption mechanism to protect any HALCON data.

PROTECTION OF TRAINED DEEP LEARNING MODELS

For machine vision applications, the protection of intellectual property is getting more and more important. This is particularly relevant in the field of deep learning. The special aspect regarding this technology is that compared to traditional methods, the quality depends not only on the algorithm itself but also significantly on the quality of the training data. A large part of the effort of deep learning applications is in collecting the data and training the models. Therefore, HALCON 22.11 includes a new encryption mechanism for HALCON data types. One major use case is the encryption of deep learning models. This allows customers to protect their investment and know-how. Thanks to this, it is ensured that only authorized users can use and view their deep learning model.



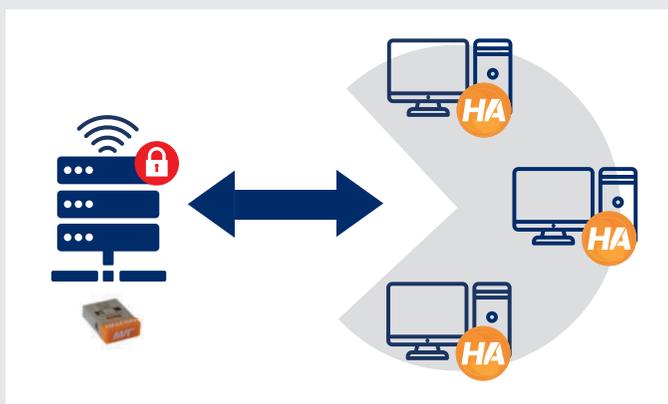
New Features in HALCON 22.11

BETTER TRACEABILITY OF DEEP LEARNING DECISIONS

A heatmap gives an indication of which areas of an image were decisive for the result of the deep learning model's classification. This can shed more light into the black box of deep learning, thereby increasing the traceability of corresponding processes. Guided Grad-CAM is a new method that now provides even more precise clues as to which regions of the image are relevant for the decision made by the deep learning network. For example, misclassifications can be investigated more precisely in a post-processing step.

NETWORK LICENSES

With HALCON 22.11, MVTec expands the licensing possibilities by adding the option to license HALCON via a network. A license server allows the use of floating licenses. Here, developers share a predefined number of licenses using a network connection. Customers benefit from cost savings due to multi-usage and greater flexibility in user allocation, developers enjoy greater independence and flexibility regarding their work location. Especially for distributed or remotely working development teams, this is the perfect way to effectively make use of HALCON's powerful machine vision algorithms. Besides this, the new mechanism enables users to work in virtualized environments without permanent physical host ID.



A new license server allows the flexible distribution of HALCON development licenses via a network connection.

SPEEDUP FOR GLOBAL CONTEXT ANOMALY DETECTION & QR CODE READER

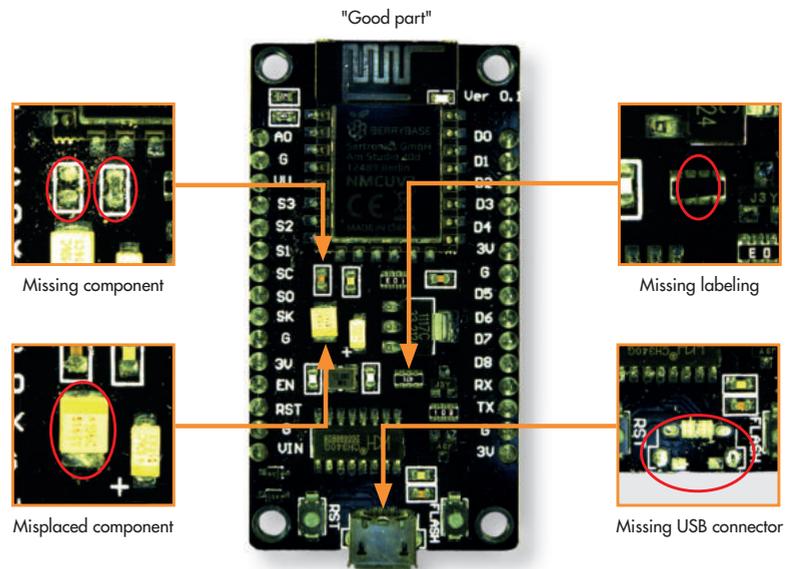
HALCON 22.11 includes a wide range of speedups for various methods and operators. In particular, executing both training and inference of MVTec's Global Anomaly Detection is now up to ten times faster, and the memory usage has been massively reduced. Besides that, the QR code reader is now faster by up to 70%.

Further Highlights of HALCON 22.11

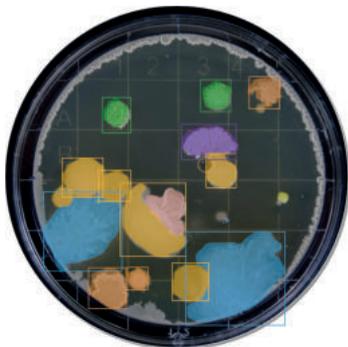
Experience HALCON's new and balanced feature set and profit from field-proven and mature technologies.

UNDERSTANDING AN IMAGE'S LOGICAL CONTENT WITH GLOBAL CONTEXT ANOMALY DETECTION

The new "Global Context Anomaly Detection" opens up completely new application possibilities with the detection of logical anomalies in images. It is a one-of-a-kind technology, which is able to "understand" the logical content of the entire image. Just like HALCON's existing anomaly detection, the new "Global Context Anomaly Detection" only requires "good images" for training, eliminating the need for data labeling. This technology makes it possible to detect entirely new variants of anomalies like missing, deformed, or incorrectly arranged components. It opens up completely new possibilities: For example, the inspection of printed circuit boards in the semiconductor production or the inspection of imprints.



The new "Global Context Anomaly Detection" feature is a world's first in this form. It allows even very subtle anomalies to be detected, as this example of an electronic board shows. In the middle, there is a defect-free board – the zoomed-in areas show various subtle defects detected by the new "Global Context Anomaly Detection".



Instance segmentation allows accurate identification and measurement of naturally grown structures, as this example of a petri dish shows.

DEEP LEARNING INSTANCE SEGMENTATION

"Instance segmentation" is a Deep-Learning-based feature, which combines the advantages of semantic segmentation and object detection. With the help of instance segmentation, objects can be assigned to different classes with pixel accuracy. This technology is particularly useful in applications where objects are very close to each other, touch, or overlap. Typical use cases also include grabbing randomly arranged objects from boxes (bin picking) as well as identifying and measuring naturally grown structures.

HALCON DEEP LEARNING FRAMEWORK

The framework allows experienced users to create their own models within HALCON. With this feature, experts can now realize even the most demanding and highly complex applications in HALCON without having to rely on pretrained networks or third-party frameworks.

AI ACCELERATOR PLUGINS

With the generic AI Accelerator Interface (AI²), HALCON can also use supported AI accelerator hardware to speed up the inference part of deep learning applications. Such special devices are widely used especially for applications in the embedded environment, but also exist more and more in the PC environment.

HALCON now provides plug-ins for the NVIDIA TensorRT inference engine as well as a plug-in for the Intel Distribution of OpenVINO™. This enables HALCON users to benefit from faster deep learning inference times on hardware that is compatible with the OpenVINO toolkit and NVIDIA TensorRT. Customers now have even more flexibility in their choice of hardware.



GENERIC SHAPE MATCHING

Generic Shape Matching makes MVTec's industry-proven shape matching technologies even more user-friendly and future-proof. By significantly reducing the number of required operators, users can now implement their solutions much faster and easier. Moreover, thanks to the unification of HALCON's different shape matching methods into a single set of operators, users can now integrate new shape-matching-related features more smoothly.



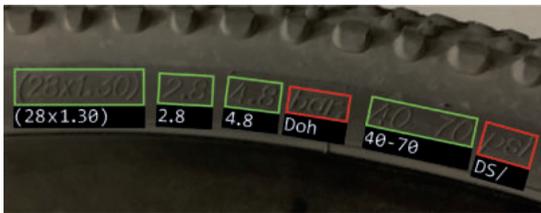
Industry-proven shape-based matching for robust localization of objects

DEEP OCR IMPROVEMENTS

Deep OCR is extended by training functionality, enabling application-specific training on the user's own application dataset. This allows users to solve even most complex applications like reading text with bad contrast (e.g., on tires). Another advantage is that very rarely used special characters or printing styles can also be trained. Training for Deep OCR recognition significantly improves the performance and usability and makes applications run even more robust. Customers also benefit from an overall improved stability and from the fact that they can address a wider range of possible applications, thanks to additional character support.



Improved robustness and extended character support for Deep OCR



Reading text with bad contrast and lighting conditions on tires without ...

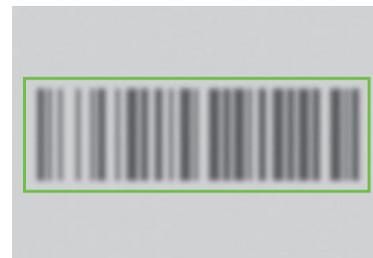


...and with the new Deep OCR training.

IMPROVED BAR CODE READING

HALCON's subpixel bar code reader is capable of reading codes with very thin bars. The subpixel bar code reader has been improved regarding low-resolved codes. The decoding rate for those can now increase up to 50%.

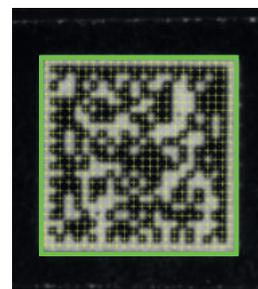
Additionally, HALCON's bar code reader is improved with respect to robustness in case of blurred Code 128/GS1-128 codes. Now, codes with a larger amount of blur can be read. Code 128/GS1-128 is a widely used bar code type that is frequently used in logistics due to its compact size and high data density.



HALCON's bar code reader can now read codes with a larger amount of blur.

IMPROVED PRINT QUALITY INSPECTION FOR ECC 200 CODES

Print Quality Inspection (PQI) refers to the evaluation and grading of certain aspects of printed bar and data codes according to international standards. HALCON supports various standards for grading the print quality of 1D and 2D codes. The PQI of data codes has been further improved. It is now up to 150% faster. In addition, the module grid determination for print quality inspection of ECC 200 has been improved. Last but not least, the usability of the PQI of data codes has been improved by introducing a new procedure that provides the grades.



Grading Results	
'Overall Quality'	2
'Contrast'	4
'Modulation'	3
'Fixed Pattern Damage'	2
'Decode'	4
'Axial Nonuniformity'	4
'Grid Nonuniformity'	4
'Unused Error Correction'	3
'Reflectance Margin'	2
'Print Growth'	4
'Contrast Uniformity'	0.2588
'Format Information'	4
'Version Information'	'N/A'
'Aperture'	0.8

The determination of the module grid for print quality inspection of ECC 200 is now much more robust.

IMPROVED DICTIONARY HANDLING

There are several improvements that make the handling of dictionaries even easier and faster. For example, dictionaries can now be initialized with a single operator call, and the syntax for adding and retrieving elements has been simplified. In addition, the auto-completion now also suggests the keys contained in the dictionary, which further speeds up and simplifies working with dictionaries.

Try HALCON FOR FREE!

Download HALCON and contact your sales partner for a free evaluation license or use our free application evaluation service.

www.halcon.com/now



What Is HALCON?

MVTec HALCON is the comprehensive standard software for machine vision with an integrated development environment (HDevelop) that is used worldwide. It enables cost savings and improved time to market. HALCON's flexible architecture facilitates rapid development of any kind of machine vision application.

What Is Included?

MVTec HALCON provides outstanding performance and a comprehensive support of multi-core platforms, special instruction sets like AVX2 and NEON, as well as GPU acceleration. It serves all industries, with a library used in hundreds of thousands of installations in all areas of imaging like blob analysis, morphology, matching, measuring, and identification. The software provides the latest state-of-the-art machine vision technologies, such as comprehensive 3D vision and deep learning algorithms.

What Is HALCON Progress?

HALCON Progress is the fast track to the latest features. With new releases approximately every six months, it gives you access to the newest features quicker and more frequently than ever before. These short release cycles are only available via an annual subscription.

Why HALCON?

The software secures your investment by supporting a wide range of operating systems and providing interfaces to hundreds of industrial cameras and frame grabbers, in particular by supporting standards like GenICam, GigE Vision, and USB3 Vision. By default, MVTec HALCON runs on Arm®-based embedded vision platforms. It can also be ported to various target platforms. Thus, the software is ideally suited for the use within embedded and customized systems.

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